

MUL Muloowurtie Land System

A land system dominated by 'sand over clay' soils with extensive dunefield areas and some isolated dunes, and with landscapes consisting of rises, slopes and drainage areas.

Area: 61.7 km²

Landscape: Rises, slopes and drainage areas, extensively overlain by sand dunes and dunefields. This area is a bedrock high – mostly underlain by Proterozoic age rock (Crawford, A.R., 1965). No surface or near surface evidence of underlying rock was encountered in field work. Soil profiles are mostly underlain by clayey sediments. However, most soils are texture contrast with sandy topsoils; and there are extensive areas of 'sand over clay' dunes and dunefields. Many low lying drainage areas and depressions (often swale areas) occur. The direction of drainage is mainly toward the northeast, following the orientation of the linear dune ridges, although surface flow is rare nowadays. Accessions of wind-deposited carbonate dust have infused into profiles in relatively recent geological times: many profiles have calcareous lower subsoils, and some soils are calcareous throughout. Many profiles are underlain by calcrete, or contain hard carbonate rubble: much calcrete is remnant dune core material.

Annual rainfall: 405 – 460 mm average

Main soils:

- G4** *sand over clay*
- G3** *thick sand over clay*
- D3** *loam over clay*
- B7** *shallow sand over clay on calcrete*

Minor soils: **B2** *shallow calcareous loam on calcrete*

Main features: The system is mostly arable, however, the deep and loose infertile sands on some dunes are only semi arable at best, and there are a few patches with non-arable stony and shallow soils. The most common soils are sandy texture contrast soils with clayey subsoils – topsoil sands can be very thick on dunes – and there are numerous loamy texture contrast soils. Soils underlain by calcrete at shallow depth are also relatively common. The presence of hard carbonate rubble and/or calcrete at shallow depth, limits profile water holding capacity and hence productive potential.

Most soils have clayey subsoils: these are typically dispersive, at least in their lower part, and are often coarsely structured. Such subsoils restrict soil internal drainage and can lead to waterlogged conditions, particularly when situated in low lying areas. Dispersive, hard, and coarsely structured subsoils also limit potential root exploration.

Topsoils are very often sandy. Sandy soils have low nutrient retention capacities, since they allow soluble nutrients to be readily leached. Clayey subsoils restrict the downward movement of these nutrients, however, they may seep laterally along clay surfaces. Wind erosion is a significant issue with loose sandy soils, especially those situated on dunes, and the water repellent nature of these topsoils compounds the problem. There is also some potential for water erosion on sloping land – texture contrast soils with loose sandy to loamy topsoils and clay at shallow depth are particularly a potential risk. Care needs to be taken with surface management in these areas to minimise the potential for wind and water erosion.

Some soils have raised subsoil salinity levels, especially in low lying areas. The surface expression of saline seepage can be seen in a few swales and depressions and a few slope areas in the west of the system. Some salinity in lower subsoils is probably due to the accumulation of cyclic salt in soil profiles. It is likely that many lower subsoils have accumulations of sodium which are toxic to the majority of crop roots.



Soil Landscape Unit summary: Muloowurtie Land System (MUL)

SLU	% of area	Main features
GHA GHB	7.8 3.7	Land dominated by sandy texture contrast soil. Main soils: <i>sand over clay</i> G4 with some <i>thick sand over clay</i> G3 on low sandy rises. With minor to limited areas of <i>shallow sand over clay on calcrete</i> B7 . GHA – rise surface with vague drainage lows (slopes 0-1%). GHB – slopes with vague drainage lows (slopes 0.5-2%).
GJL GJO GJV	3.3 2.9 0.4	Land dominated by sandy texture contrast soil. Main soils: <i>sand over clay</i> G4 grading to <i>loam over clay</i> D3 . With areas of <i>shallow sand over clay on calcrete</i> B7 in some units. GJL – slopes with vague drainage lows (slopes 0-5-2.5%); with minor surface expression of saline seepage. GJO – depression/drainage area with a few drainage lows/drainage ways (slopes 0-1%). GJV – rise with a drainage low (slopes 0.5-2%); remnant dune core area – possibly with some hard scalds.
GUA GUB GUE GUK GUL GUO	8.7 22.9 1.4 1.0 7.7 1.7	Land dominated by sandy texture contrast soil. Main soils: <i>sand over clay</i> G4 grading to <i>loam over clay</i> D3 . With areas of <i>shallow sand over clay on calcrete</i> B7 , and possibly some <i>thick sand over clay</i> G3 on some very low sandy rises. GUA – rise surface with some drainage lows (slopes 0-1%). GUB – rises and slopes (slopes 0-2%). GUE – drainage depression (slopes 0-1%). GUK – low lying plain (slopes 0-1.5%). GUL – gently undulating slopes with drainage lows/drainage ways (slopes 0.5-2.5%). GUO – depression with drainage lows/drainage ways (slopes <1%).
HVK	1.2	Land dominated by loamy texture contrast soils formed in clayey sediments. Main soils: <i>loam over clay</i> D3 grading to <i>sand over clay</i> G4 and possibly some <i>calcareous loam</i> A5-A4 , and possibly with some <i>shallow loam over clay on calcrete</i> B6 grading to <i>shallow calcareous loam on calcrete</i> B2 . HVK – gently undulating elevated plain (slopes 0.5-1.5%).
HXO	1.7	Land dominated by loamy texture contrast soils formed in clayey sediments. Main soils: <i>loam over clay</i> D3 . HXO – depression/drainage area (slopes 0-1%).
OaC OaM	1.8 1.4	Sand over clay dunes and dunefields. Main soils: <i>thick sand over clay</i> G3 grading to <i>sand over clay</i> G4 where swales occur. OaC – sand dune. OaM – land with 60-90% sand dunes.
ObD	1.4	Sand over clay dunes. Main soils: <i>thick sand over clay</i> G3 grading to <i>shallow sand over clay on calcrete</i> B7 and <i>sand over clay</i> G4 . ObD – low sand dune.
OeM	16.6	Sand over clay dunes. Main soils: <i>thick sand over clay</i> G3 , grading to <i>sand over clay</i> G4 , <i>shallow sand over clay on calcrete</i> B7 and <i>loam over clay</i> D3 in swales. OeM – land with 60-90% sand dunes with some salinised patches in swales.
QjA QjL	0.1 0.5	Land dominated by shallow soil on calcrete. Main soils: <i>shallow calcareous loam on calcrete</i> B2 grading to <i>shallow sand over clay on calcrete</i> B7 and <i>shallow loam on calcrete</i> B3 . Possibly with some rubbly <i>calcareous loam</i> A5-A4 . QjA – slight slopes (slopes 0-1%). QjL – slopes (slopes 0.5-3%).
QnB	1.1	Land dominated by shallow soil on calcrete. Main soils: <i>shallow calcareous loam on calcrete</i> B2 grading to <i>shallow sand over clay on calcrete</i> B7 and <i>shallow loam on calcrete</i> B3 . QnB – rises (slopes 0.5-2.5%).
RRA	1.2	Land dominated by shallow soil on calcrete. Main soils: <i>shallow sand over clay on calcrete</i> B7 . RRA – stony rise (slopes 0-1.5%); a remnant dune core area.



RTA	1.4	Land dominated by shallow soil on calcrete.
RTL	7.7	Main soils: <i>shallow sand over clay on calcrete</i> B7 . With some <i>loam over clay</i> D3 in lows, and some <i>sand over clay</i> G4 on low sandy rises. RTA – rise surface/elevated plain (slopes 0-1%). RTL – slopes and rises with some drainage lows/drainage ways (slopes 0-3.5%). RTO – low lying plain/drainage area with some drainage lows/drainage ways (slopes 0-1.5%).
RTO	2.3	
ZA-	0.1	
ZAe	0.2	Salinised land. Main soils: <i>saline soil</i> N2 : primarily a saline variant of a D3 soil. ZA- – salinised depression (5-4s). ZAe – salinised sloping drainage depression (5s).

Detailed soil profile descriptions:

Main soils:

- G4** *sand over clay* [Hypercalcic-Lithocalcic Red-Brown Sodosol-Chromosol]
Medium thickness loamy sand to sand overlying a red to red brown clayey subsoil. Subsoils may contain hard carbonate rubble. Often only lower subsoils are calcareous. Subsoils can be coarsely structured, and are typically dispersive, at least in their lower part. Profiles can sometimes be underlain by calcrete at moderate depth or more. The sandy topsoils are typically water repellent. These soils grade to similar soils with thick to very thick sandy topsoils which are found on sand dunes: *thick sand over clay* (soil **G3**).
- D3** *loam over clay* [Hypercalcic-Lithocalcic Red-Brown Chromosol]
Medium thickness to thin loamy to clay loamy topsoil (mostly sandy loam) overlying red to red brown clayey subsoil. Subsoils can contain hard carbonate rubble. Subsoils can be coarsely structured, and are typically dispersive at least in their lower part. Profiles can be calcareous throughout, especially in low lying areas, but more commonly are calcareous only in the lower subsoil.
- B7** *shallow sand over clay on calcrete* [Petrocalcic Red-Brown Sodosol-Chromosol]
Medium thickness to thin, or occasionally thick, sandy topsoil overlying a red to red brown clayey subsoil, which is underlain by calcrete at shallow depth. This is a shallow variant of soil **G4**. Profiles often have hard carbonate rubble in the layer directly overlying the calcrete layer. Subsoils are often not dispersive. Profiles are occasionally calcareous throughout. The sandy topsoils are typically water repellent. These soils grade to similar soils with loamy topsoils: *shallow loam over clay on calcrete* (soil **B6**).

Minor soils:

- B2** *shallow calcareous loam on calcrete* [Petrocalcic Calcarosol]
Grey brown to brown calcareous loamy to clay loamy soil overlying calcrete at shallow depth. Profiles often contain abundant hard carbonate rubble. Typically found on stony rises. These soils grade to similar soils with non calcareous topsoils: *shallow loam on calcrete* (soil **B3**).

References: Crawford, A.R. (1965). 'The Geology of Yorke Peninsula'. *Bull. geol. Surv. S. Aust.*, 39.

Further information: [DEWNR Soil and Land Program](#)

